

Master Programme in Embedded Electronics Engineering

Programme code: TAEFE

Scope: 120 credits

Cycle: Second

Approved by: Educational Programmes Board A

Validity: 2015/2016

Date of approval: 10 April 2015

In addition to the syllabus, general regulations and information for the Faculty of Engineering apply to this programme.

1 Aim and outcomes

1.1 Aim

This internationally oriented Master's programme aims to develop the students' knowledge, skills and judgement in the area of embedded electronics engineering. It is motivated by the dramatic changes taking place in the Application Specific Integrated Circuit (ASIC) and IC fields. Thirty years of circuit design have been dominated by the design of single functions, processor cores, accelerators, etc. Using cutting-edge technology it will be possible to integrate entire systems on one chip. For a number of years, research at Lund University has focused on this problem. Experience gained from this research has been incorporated in the Master's programme.

The Master of Science aims to

- provide students with sound interdisciplinary skills in the fields of electrical engineering and computer science, and
- provide students with specialised knowledge that covers all levels of abstraction from electronic systems to the actual construction of a circuit.

The programme is characterised by a holistic view of circuit design which gives a qualification which is directly applicable in industry, internationally, nationally and in the region.

1.2 Outcomes for a Degree of Master of Science (120 credits)

(Higher Education Ordinance 1993:100)

Knowledge and understanding

For a Degree of Master of Science (120 credits) the student shall

- demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work, and
- demonstrate specialised methodological knowledge in the main field of study.

Competence and skills

For a Degree of Master of Science (120 credits) the student shall

- demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information,
- demonstrate the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work,
- demonstrate the ability in speech and writing both nationally and internationally to report clearly and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences, and
- demonstrate the skills required for participation in research and development work or autonomous employment in some other qualified capacity.

Judgement and approach

For a Degree of Master of Science (120 credits) the student shall

- demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work,
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

1.3 Specific outcomes for a Degree of Master of Science (120 credits)

Knowledge and understanding

For a Degree of Master of Science (120 credits) students shall

- demonstrate specialised knowledge of the foundations in electronics and computer science to the sub-fields relevant to the field of embedded electronics engineering,
- be able to analyse the components from different domains of embedded electronics engineering,
- understand how different domains interact, such as hardware versus software and analogue versus digital construction, and
- demonstrate knowledge of intellectual property rights in general and of the field of embedded electronics engineering in particular.

Competence and skills

For a Degree of Master of Science (120 credits) students shall

- demonstrate the ability to identify, formulate and deal with complex issues in the field of embedded electronics engineering critically, autonomously and creatively and with a holistic approach,
- analyse and critically evaluate different technical solutions,
- demonstrate the ability to participate in research and development projects,
- demonstrate the ability to critically and systematically acquire new knowledge in the field of electronics and integrate this with previous knowledge,
- demonstrate the ability to design, simulate and evaluate systems or parts embedded electronics engineering,
- demonstrate the ability to autonomously plan and complete advanced tasks,
- demonstrate the ability to develop and design electronic systems and their constituents while taking into account the circumstances and needs of individuals and the targets for sustainable development set by the community, and
- demonstrate the ability to report in speech and writing their knowledge and different types of project work, including background material, investigation and findings, to expert and non-expert audiences in international contexts.

Judgement and approach

For a Degree of Master of Science (120 credits) students shall

- demonstrate the ability to make assessments informed by relevant disciplinary, social and ethical aspects,
- demonstrate the capacity for teamwork and collaboration with various constellations, and
- demonstrate the ability to identify their need for further knowledge in the field and to continuously upgrade and broaden their knowledge.

1.4 Further studies

On completion of the second-cycle degree, students have basic eligibility for third-cycle studies.

2 Programme structure

The programme includes a compulsory block of courses comprising 54 credits and intended to provide an orientation in modern chip design. The aim is to provide a general overview of embedded electronics engineering and a foundation for an understanding of all types of IC design, i.e. in digital, mixed signal and analogue design, and also basic knowledge of built-in systems. An important component, which is also compulsory, is a large IC project I and II in total of 15 credits. Several groups will be asked to choose a number of critical components from a system which can be produced in silicon, i.e. sent away for manufacture or implemented in an FPGA and thereafter verified. The projects included can be digital, analogue, mixed signal or for high frequencies, but, above all, the projects aim to achieve a higher level of abstraction, a totality, where the individual projects are part of a complete system-on-chip.

2.1 Courses

The programme includes a compulsory non-technical course in intellectual property rights. In addition, the student may choose 7.5 credits of other courses not offered within the framework of the programme. Students may be allowed to attend PhD courses that fit into the master's programme. In addition to these courses, students are entitled to accreditation of 7.5 credits of courses in Swedish (organised by Lund University for exchange students).

The courses included in the programme are indicated in the timetable.

3 Specific admission requirements

3.1 Admission requirements

A Bachelor's degree in electrical engineering, computer science or equivalent. The applicant must have basic knowledge of digital and analog circuits, corresponding to no less than 6 month of study. Students must also have documented proficiency in English corresponding to at least English 6 in Swedish upper secondary school.

4 Degree

4.1 Degree requirements

For a Degree of Master of Science (120 credits) students must successfully complete courses comprising 120 credits, including a degree project worth 30 credits. 75 credits must be second-cycle credits, including the degree project.

4.1.1 Degree project

For a Degree of Master of Science (120 credits) the students must complete an independent project (degree project) of no less than 30 credits as part of the course requirements. The degree project must be completed in accordance with the valid course syllabus and must deal with a relevant subject.

4.2 Degree and degree certificate

When students have completed all the degree requirements, they are entitled to apply for a degree certificate for a Master of Science (120 credits). Main Field of Study: Electronic Design.